

# Experience Accelerator Overview

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## **Problem Statement:**

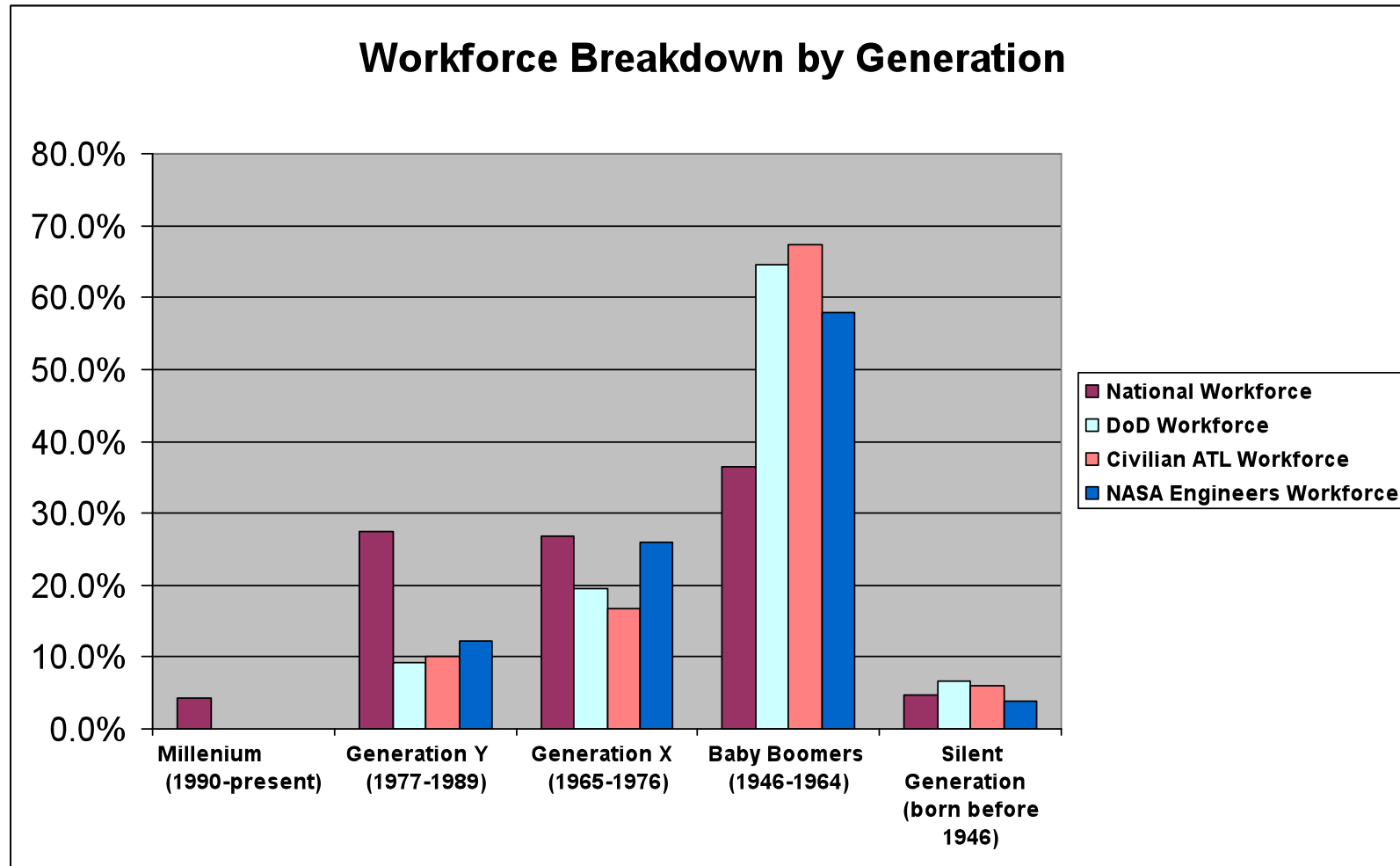
Traditional Systems Engineering (SE) education is not adequate to meet the emerging challenges posed by ever increasing Systems and Societal demands, the workforce called upon to meet them and the timeframe in which these challenges need to be addressed.

## **Program Goal:**

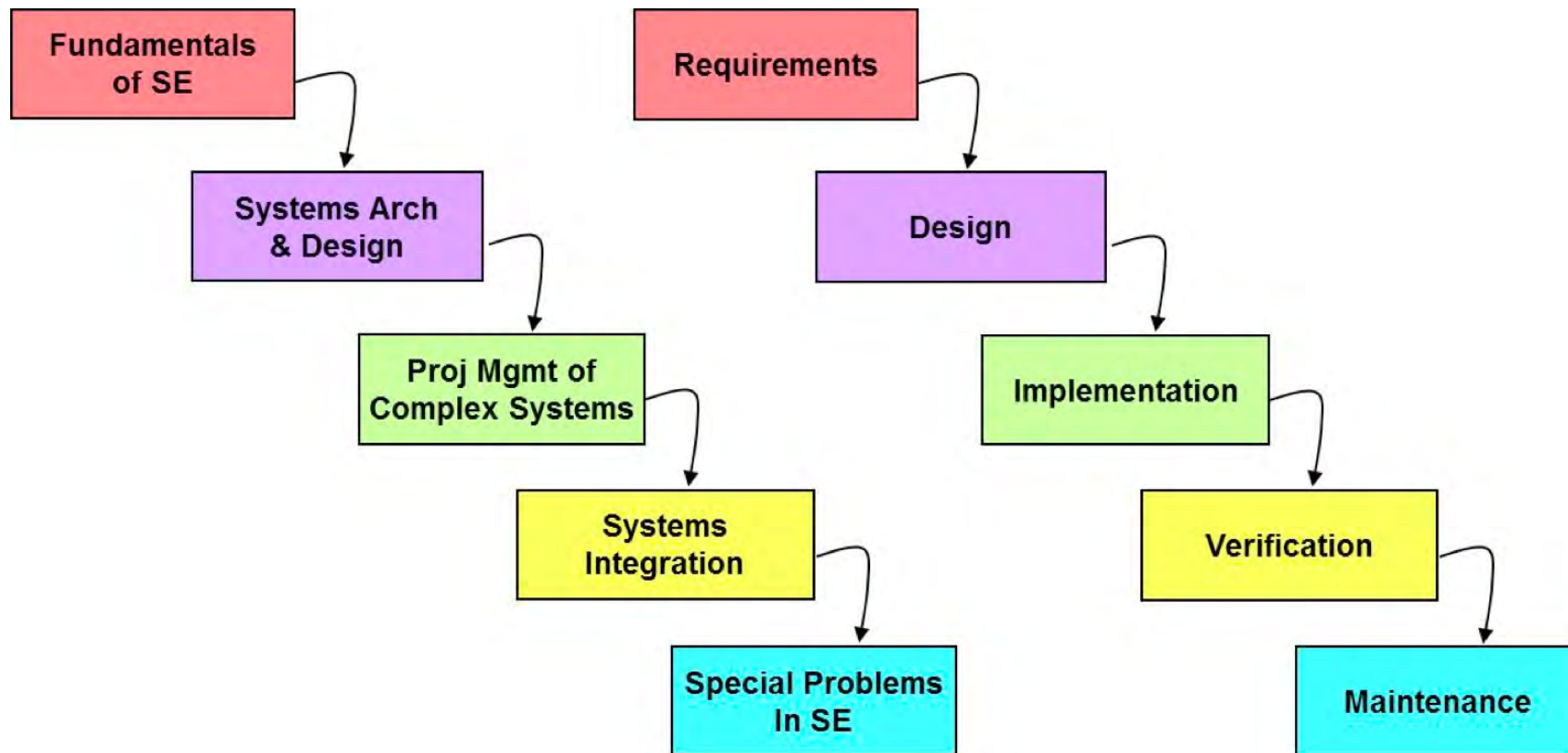
Transform the education of SE by creating a new paradigm capable of halving the time to mature a senior SE while providing the skills necessary to address emerging system's challenges.



Mature SEs in half the amount of time required to reach senior level experience and in a cost effective way



# Education and SE Waterfall Processes



## New Paradigm Must Be:

- **Experience Based:** Providing accelerated learning opportunities through experience based, interactive sessions (Kolb, 1984)
- **Agile:** Allowing for quality, timely development of course material that is most appropriate for the target students
- **Integrated:** Provides an integration point of multi disciplinary skills and a wide range of Systems Engineering knowledge in a setting that recreates the essential characteristics of the practicing environment.
- **Lean:** Providing the greatest amount of benefits with the minimal number of steps and least amount of effort.

## New Paradigm Must Be:

- **Leveraged:** Enabling capability growth through the leveraging of computational and information technologies and prior Systems work.
- **Extensible:** Providing the capability to expand and enhance capabilities for future growth without having to make major changes in the infrastructure.
- **Implementable:** Enabling widespread impact through economically viable, rapid development and deployment of educational and training programs for participants with multiple levels of competence and background.

- **The Experience Accelerator will be a training simulation intended for lifelong learning of the Systems Engineer providing:**
  - A supplement to education and training
  - General job-related experience
  - Specific contextualized job experience
  - A measure of the compatibility of the learner to a specific role and responsibility at the current time; and a measure of the potential for growth into new roles and responsibilities moving forward



- Success of the year one prototype will be indicated with a positive result in the following areas:
  - Experienced Lead Program Systems Engineers authenticate the Experience Accelerator and provide useful feedback on areas of improvement.
  - Learners have identified that it has a significant favorable impact (e.g., per DAU course evaluation questions).
  - The potential for learners who successfully complete the training to be able to immediately implement lessons learned from the training experience to the job, assuming the culture allows this.
  - The potential for PSE's to be able to perform targeted Level 3 competencies at one or more higher levels of proficiency.

# Research Questions

- **Cycle Time Reduction** – A suite of processes and tools, including those noted above, which can increase the quality of the systems while compressing latency through the life cycle; these include tools which not only accelerate new development, but also eliminate unnecessary work such as facilitating reuse and providing correct by design construction
- **Legacy Integration** – the capability to monitor and characterize the current legacy system to ensure that the addition of new applications and services have the desired capabilities, and the ability to integrate independently evolving components into a larger interoperable system
- **Risk/Opportunity Management** – tools which can assist in the assessment of program risk and value creation to allow for the proper tradeoffs between these competing goals based on the capabilities of the organization and the challenges of the system under development
- **Human Aware/Self-Adaptive** – the capability to optimize the use of humans in the system to take advantage of self-adaptive human capabilities

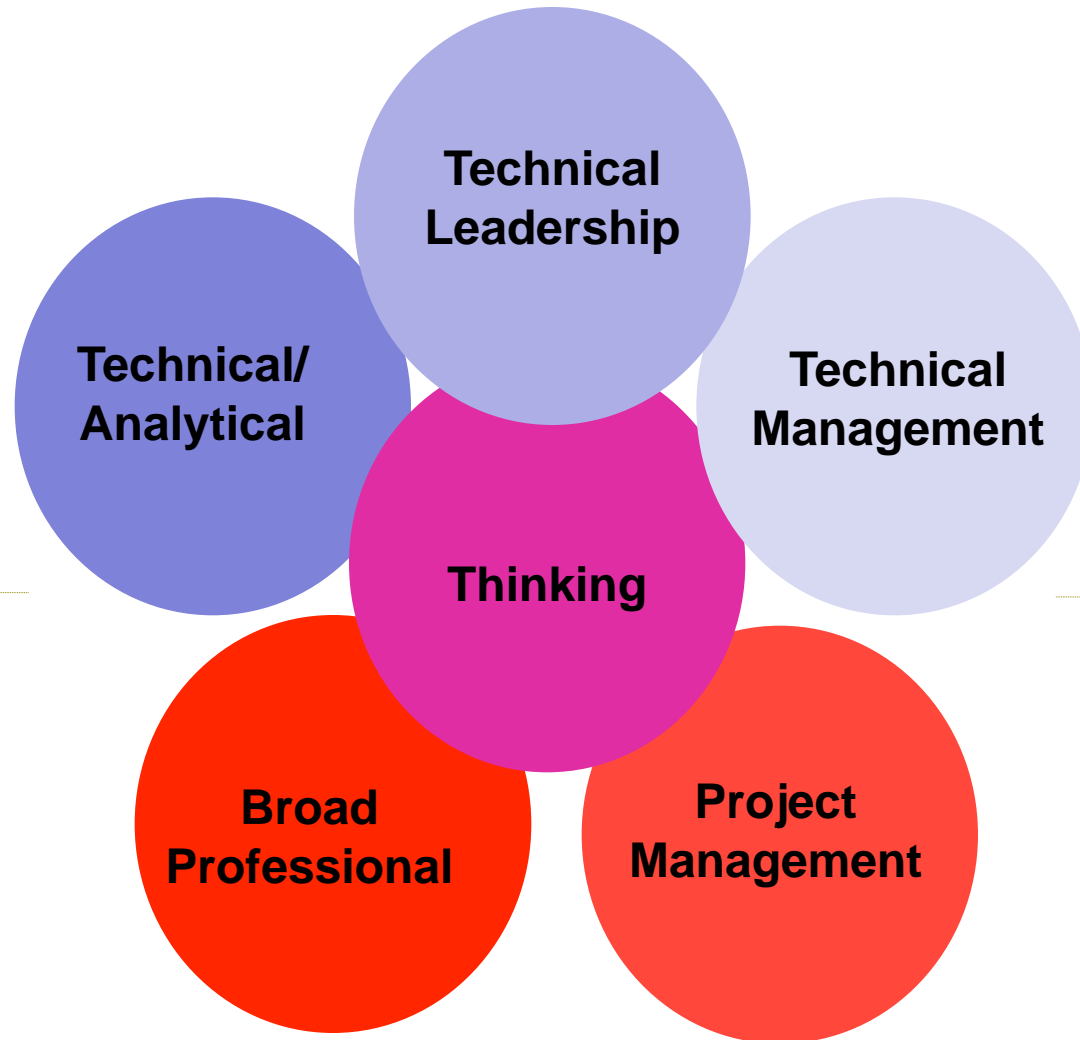
# Targeted Competencies

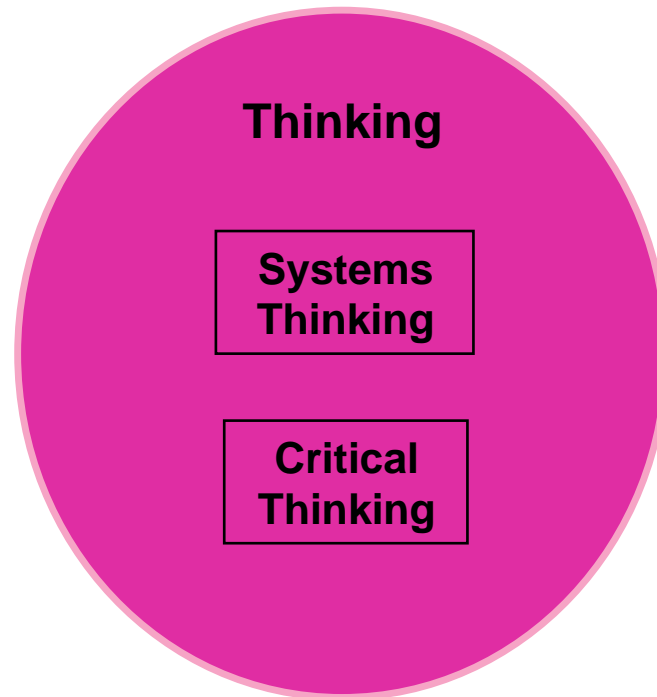
**Program  
Systems  
Engineer  
(PSE)  
Level III**

Technical  
Expertise

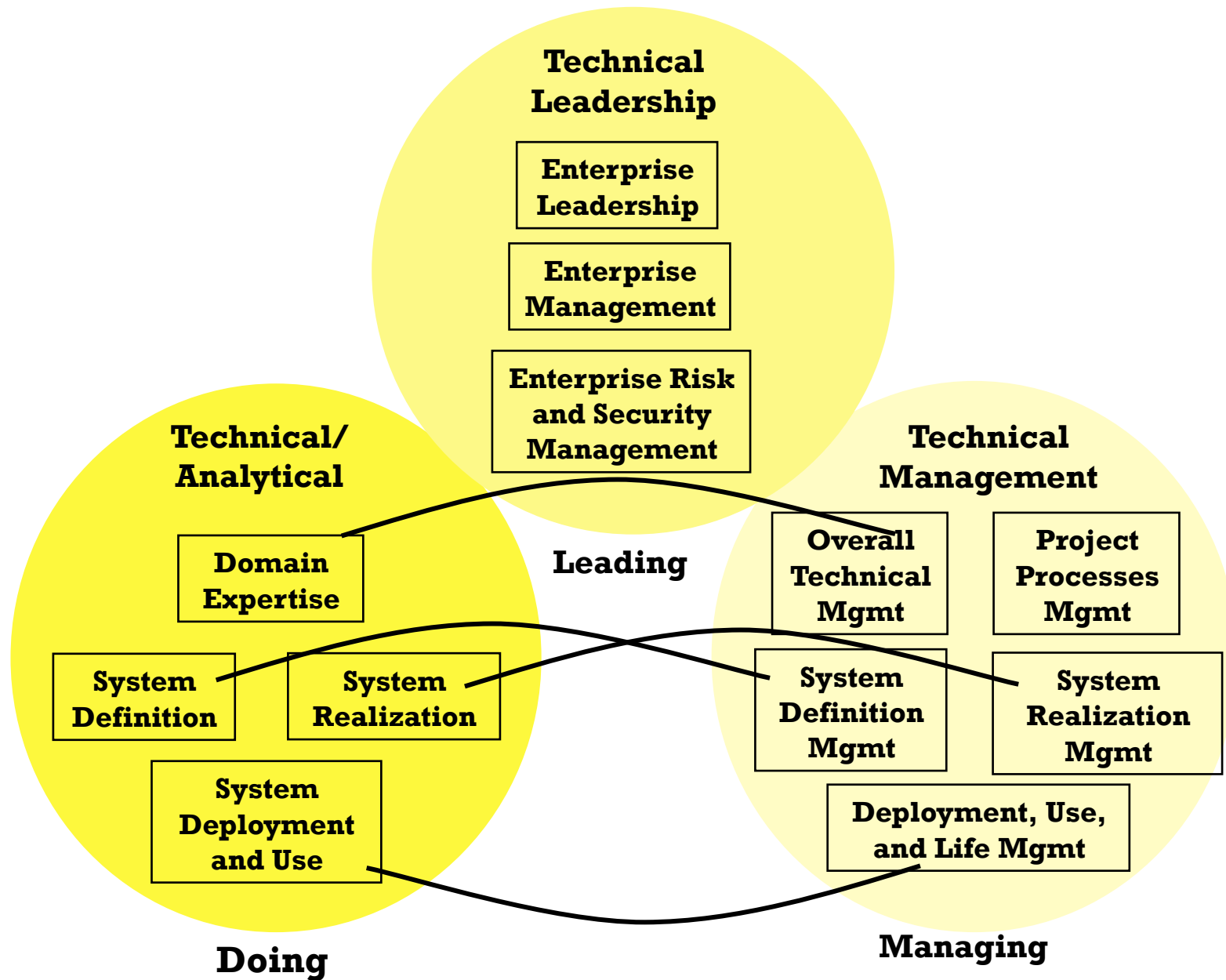
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Domain  
Independent

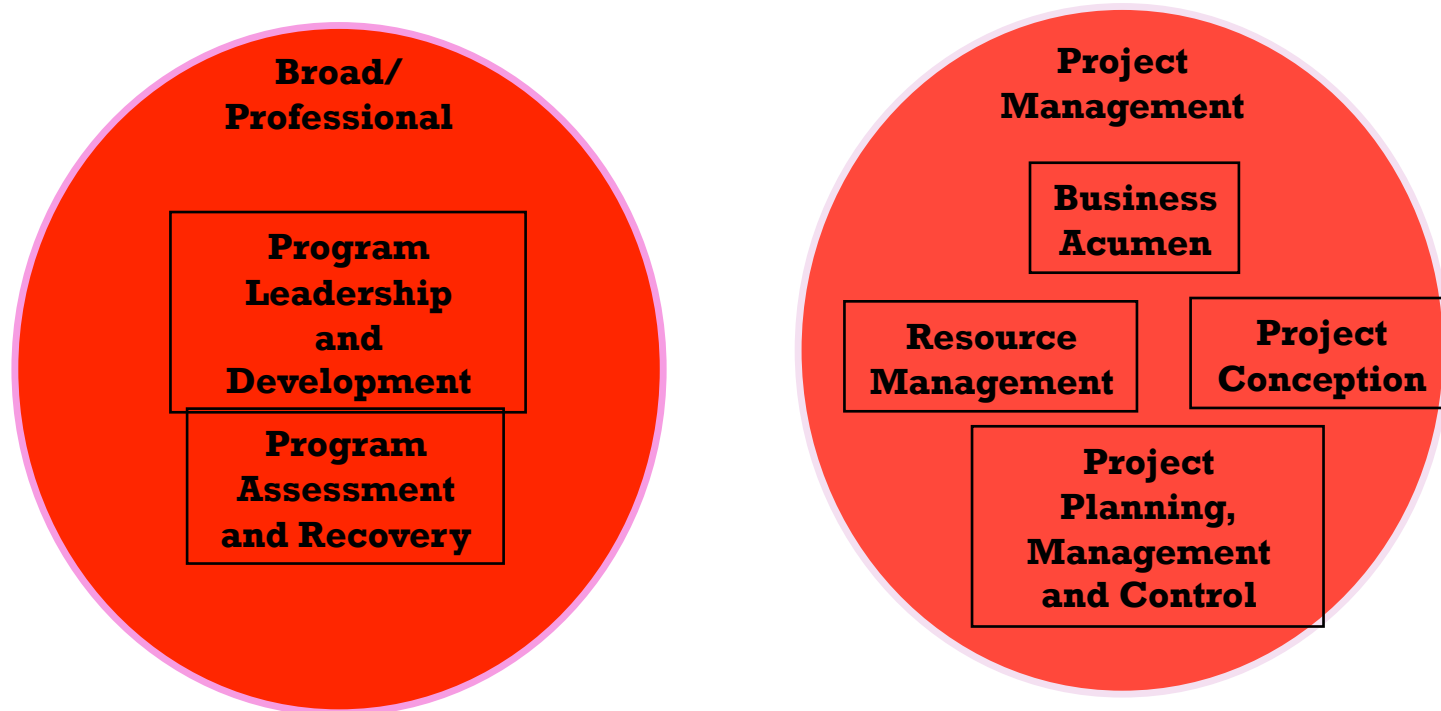




# Technical Expertise

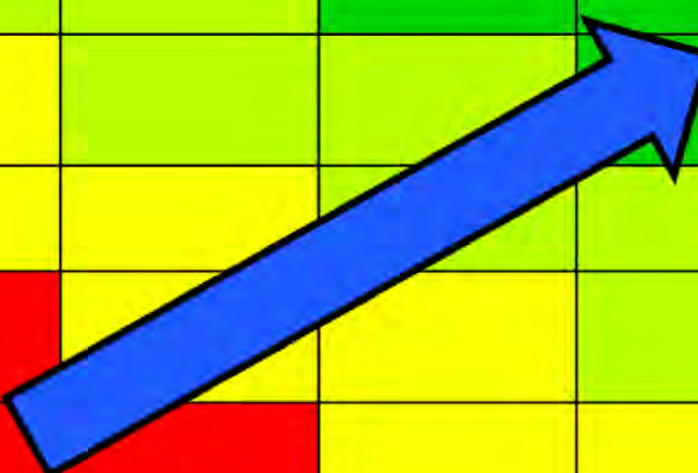


# Domain Independent

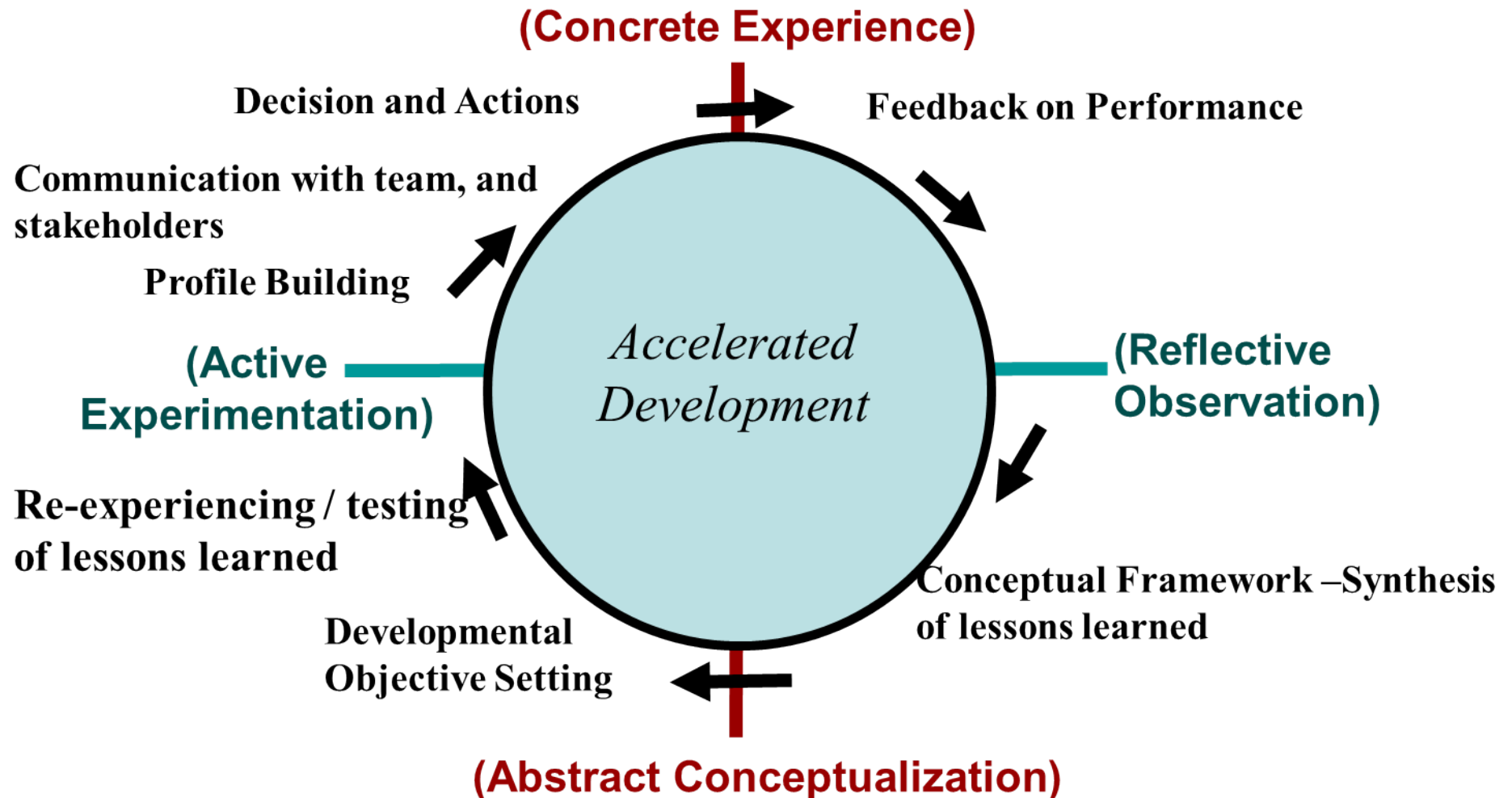


# Proficiency Levels

|                       | Proficiency Level  |                     |       |                |                      |
|-----------------------|--------------------|---------------------|-------|----------------|----------------------|
| Situation Complexity  | None or Aware only | Apply with guidance | Apply | Manage or Lead | Advance state of art |
| Exceptionally complex |                    |                     |       |                |                      |
| Considerably Complex  |                    |                     |       |                |                      |
| Complex               |                    |                     |       |                |                      |
| Somewhat complex      |                    |                     |       |                |                      |
| Simple                |                    |                     |       |                |                      |



# EA Block Diagram



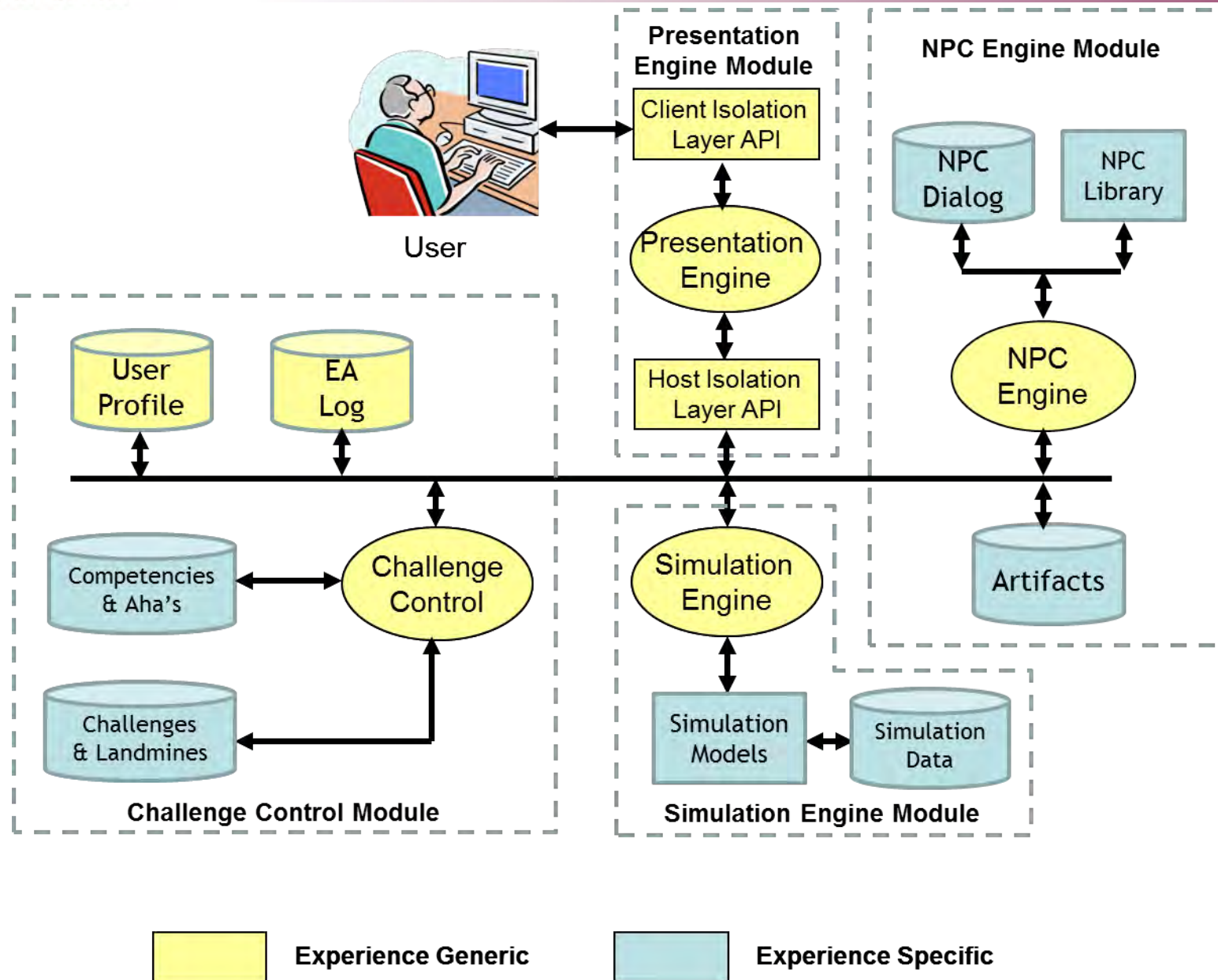


- A set of common mistakes or anti-patterns of success that have been reported for inexperienced or non-expert systems engineers.
- Anti-patterns are important so that we can capture the right heuristics.
- These mistakes are fairly generic and are applicable to a number of different domains.
- These mistakes can be seen as the factor which causes injury and subsequent desirable “scar” formation and the principle behind an “aha” concept.
- The experience, identification and internalization of such mistakes aid in building the scar tissue which aids in preventing future mistakes of the same type.

- Information Gathering
- Processes
- Decision Making
- Conceptual Issues

- **Single User**
- **Single-Team**
- **Multi-Team**

# High Level Architecture



## ■ Behavioral Component

- Personal background & interests
- Educational experiences
- Professional experiences – “aha” moments
- EA experiences
- Competencies

## ■ Personality and Values Component

- Personal Styles Inventory
- Value Alignment Inventory

## ■ Attitudes Component

- Social Cognitions Inventory



- Collected data on game engines
- Reviewed data for accuracy
- Determined critical factors:
  - Web hosted
  - Source code
  - High Productivity
  - Low Cost
  - Execute on laptop/PC with no external graphics card
- Reduced list to front runners

- UAV Acquisition
- User is PSE for a new UAV acquisition program that has run into problems in the integration phase. The individual is replacing the past PSE on the project
- The PSE must diagnose the existing problems and determine how to correct these problems and make the project a success while staying on time.

